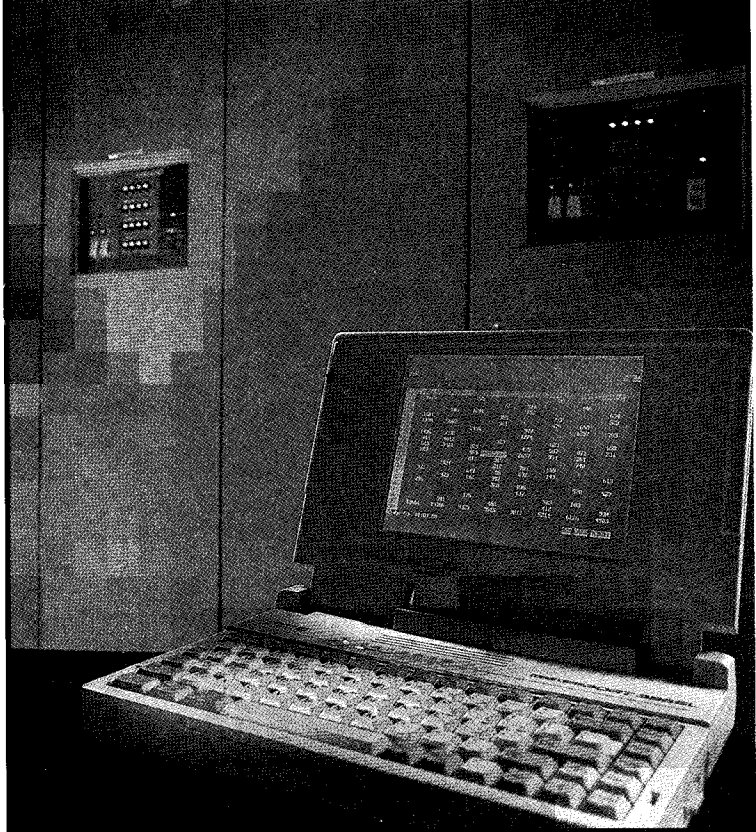


Is the mainframe DEAD, DYING, or just CONVALESCING?

*The manner by which
we have used large,
centralized mainframe
computers is undergoing
a wrenching and
radical change.*

By J.A. Carroll



In reading any magazine, newspaper, or publication, one would increasingly assume that the mainframe, born in the 'fifties, maturing in the 'sixties, and reaching its prime in the 'seventies, is now a withered old relic, ready to be cast off into the junkyard of computing history.

Surveys make clear that most companies are re-examining the fundamental underpinning of their computer system architecture. Technologies such as personal computers, workstations, and local area networks are having a profound impact on the means by which organizations establish their computer horsepower.

New application models, with terms such as groupware and client/server computing, are touted as the future of computing. Discussion of information technology is today punctuated with buzz-phrases, such as downsizing, right sizing and business process re-engineering.

Suddenly, it seems that all of our assumptions on how we should solve the business applications within our organizations using computer technology are being shaken to the core.

Even if we ignore the industry hype, and clear away the marketing excess, one issue is clear: the manner by which we have used large, centralized, mainframe computers, is undergoing a wrenching and radical change.

We are told that the era of the mainframe is over. We hear the refrain that the mainframe is dying, or perhaps, is already dead. In hearing this message, we wonder if the mainframe really does play a role in our computer systems of the future.

A trend to downsize

The computer industry has borrowed a phrase born in economic recession, using "downsizing" to describe the process of moving applications from larger systems onto smaller, distributed systems.

The press is full of stories of downsizing activities by companies as diverse as the Royal Bank of Canada and the Canadian Imperial Bank of Commerce, GM, Motorola, Hughes Aircraft, and Boeing. Hardly a day goes by without a report about yet another company in the midst of a major downsizing activity.

At any given moment, there are any number of conferences, seminars, training courses and vendor seminars on the topic. A veritable mini-industry has grown up around the phrase.

A major shift in technology

What is happening is a major shift in the technology base in organizations. In the last decade, we have witnessed a stunning transformation of the corporate computing environment:

- ❑ the cost of hardware continues to decrease at dramatic rates, with current estimates that \$100,000 of computing power of 10 years ago, is available for a mere \$10,000 today;
- ❑ the days of laborious custom software coding are disappearing, replaced by sophisticated CASE tools (computer-aided software engineering), application development software such as Lotus Notes, "rapid application development methodologies," and other magical tools that ease creation of sophisticated business applications;
- ❑ use of increasingly sophisticated PC and workstations' software continues to explode in organizations.

Perhaps the most profound change in the last couple of years has been the introduction and acceptance of the local area network, or LAN.

A survey of 450 medium and large-sized companies by the research organization

TFS indicated that, from 1991 to the end of 1993, the number of LANs per company will grow by a factor of seven, with a doubling in the number of LAN users. The study indicates that the number of inter-

connections between these LANs will double, and that network traffic itself will grow by a factor of 56 times in three years. The impact of the LAN on the mainframe is

substantial. In 1990, only 2% of the PCs at sites with IBM mainframes were networked. Today, that figure has already grown to 20%.

As a result, PC-based LANs, once considered to be on the edge of the computer scene, are today recognized as a significant, and indeed critical, part of the overall corporate computing strategy of the firm.

"Networks are increasingly viewed as part of the corporate computing strategy," says Alan Goldberg, manager, micro services of H.J. Heinz Company of Canada. "PCs and networks were initially viewed by MIS as something used only by individuals on a case by case basis, but they are now seen as an extension of the data processing domain."

Why are companies moving off the mainframe?

Coincident with these changes in the computer industry is recognition that it no longer makes sense to build all business applications on a centralized, mainframe data processing centre.

These changes have resulted in an increasing focus on "downsizing" information technology (IT) applications, often involving something called the client/server model of computing. One survey suggests that 35-40% of Fortune 1000 companies in the U.S. are actively pursuing client/server applications, while another survey suggests the figure is closer to 80%.

Jan Duffy, an information technology consultant with Toronto-based Duffy Consulting Group, states that "Downsizing of applications seems to come about in one of three ways. First, there is a general trend to downsize information technology systems within organizations, for expected cost savings or because of the increased flexibility that can be found in smaller systems. Second, downsizing of information tech-

nology (IT) occurs because of a conscious decision to re-engineer applications. And finally, it happens merely because the company itself downsizes."

Buzzwords explained

The field of computerization is littered with buzzwords. In the area of downsizing, there are a number of specialized terms.

Business Process Re-engineering is the process of rebuilding a business application in a much more efficient design, rather than computerizing the existing process. For example, instead of computerizing all of the current steps involved in an accounts payable application, BPR would examine all the processing steps that are involved with invoice payment, and would re-design the process such that an efficient application is created. Wasteful and inefficient processing steps, both manual and computer-related, are eliminated through the process.

Computer-Aided Software Engineering (CASE), uses a set of computer software tools, which assist in the design of computer applications. Usually, CASE software will assist with the key steps of planning, analyzing, designing and generating a business application.

Client/server computing model, in which the client computer acts on behalf of the user to access the server computer, which contains the data required by the application. The client contains the intelligence to formulate a query for the data, while the server contains the horsepower and capability to store the data and search and access it quickly. A client can be used to access a number of server applications, resulting in more flexible application design capabilities. Likewise, a single server can service a number of clients.

Graphical User Interface, (GUI): programs like Microsoft Windows, OS/2, and the Macintosh computer interface, which provide a method of iconic representation, symbols, "point-and-shoot" and a computer mouse for use of computer programs, compared to the older method of using clumsy keyboard commands and difficult computer languages.

Workstations can be thought of as personal computers on steroids. Workstations tend to be used mostly within scientific, engineering or other applications that require heavy calculation capability. Workstations are usually Unix-based, support GUIs, run sophisticated engineering, design or financial applications.

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Benefits of downsizing

There is broad consensus that potential cost savings and flexibility are the two major benefits of IT downsizing.

The savings reported in the press are impressive, to say the least. A recent study by the Butler Cox Foundation estimated savings of up to 30% in overall systems costs in the first five years after a downsizing effort.

DuPont, an early proponent of client/server computing, has plans to reduce its 150 VAX processing centres to 75 by the end of the year. Eventually, it plans to have only 10 of these centres, and expects to pare \$295 million off of an estimated \$1 billion computer and telecommunications budget.

You don't have to be in the Fortune 500 to enjoy such savings. Constar Plastics, with \$543 million in sales, estimates that it will save almost \$1.6 million a year through its own downsizing activity.

Flexibility in application design is the other major benefit. Proponents of downsizing believe that it is much easier to develop sophisticated applications that are easier to use on smaller, networked systems than it is on large, centralized data processing systems. Computerland estimates that applications which previously took two years to develop, can now be implemented within six to 12 months.

Certainly, one of the advantages of the client/server model is the flexibility and sophistication of packaged software available on the market today. Gone are the days of the five-year, grand design project in which much of the time is spent on trying to define the best computer system possible. Instead, we see the "just-in-time" business application, designed and implemented in a hurry to solve a critical business need.

Notes, a groupware product from Lotus Development Corporation, is an example of what is becoming available. "To take a mainframe data base and turn the data into something useful is an increasingly complex task," states Colin Wyatt, president of Lotus Canada. "Whereas with Notes, you can write an application in days instead of years."

Wyatt indicates that with Notes, "We are seeing very meaningful applications put together very quickly. In today's environment, you need to make a quick decision on how to build an application. It doesn't make sense in many cases to use dumb terminals linked into a mainframe application

written by a programmer that you've never met. Instead, you want to use the tools that are available to get an application out to your users very quickly."

Hidden costs

But if there are benefits from moving applications off of a mainframe, it is also true that there are hidden costs. Some companies that jumped onto the downsizing bandwagon early are now starting to indicate that the expected savings have not materialized.

At a conference in Chicago recently, Harley Davidson stated that their move from an IBM mainframe to a system centred on IBM AS/400 and PC network technology has not resulted in the expected 50% initial savings and 35% per annum cost savings, as a result of much higher transitional, support and training costs.

It seems that the truth of the matter is that, while downsizing applications appear to offer lower costs for hardware and software, an organization can be faced with dramatically higher transition, support, maintenance, personnel, training and administration costs.

Any organization that plans to begin downsizing applications must recognize that there are substantial hidden costs that are difficult if not impossible to quantify in advance.

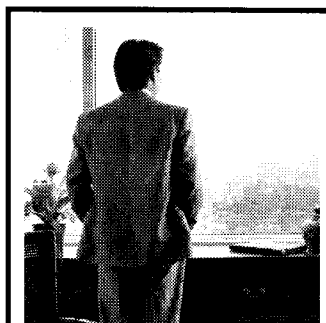
Network management

Managing the resulting networked environment is the major challenge that companies encounter.

States Goldberg of Heinz, "99% uptime on a mainframe is expected, and contracts are based on this performance. Data processing departments are accustomed to managing that type of performance, and have come to expect that within mid-range, client/server and PC LAN environments." As MIS takes over responsibility, there is an expectation that the LAN should be managed with the same degree of sophistication.

"With the LAN and the network management issue, it becomes a question of, can we monitor it, can we restore it, can we understand capacity issues, and can we deal with all of the other system management issues that we are accustomed to" ?

As these tools do not yet exist in a mature form, Goldberg believes that network management is a major problem. "Although LAN management tools exist and



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continue to be developed, standards that permit products from one vendor to communicate with those from another for network management purposes, don't quite exist," states Goldberg. This leads to a number of makeshift methodologies in organizations to manage large-scale networks, leading to inefficiencies and, hence, higher support costs.

Clearly, network management is a significant concern. A recent survey in a ma-

plications indicate that perhaps the highest cost results from the training issue. An organization finds itself developing applications using methodologies that it is unfamiliar with. Development takes on a bit of a hit-and-miss approach, until the development staff is retrained in the art of design of client/server applications. Over time, the costs to develop new applications are a lot higher than they were in the old, centralized mainframe system.

MAKESHIFT METHODOLOGIES to manage large-scale networks lead to inefficiencies and higher support costs.

major computer industry publication indicated that LAN and network management was at the top of the list for a substantial number of companies.

Support and other costs

There are also costs associated with supporting a sophisticated network environment. A study by the Meta Group, a U.S.-based research agency, estimated that PC LAN support ranges from \$750 to \$1,000 per user, per year.

In large scale networks, this support cost becomes a substantial bottom line figure, that can have a dramatic impact on the estimated cost savings from downsizing. There is a belief that it is a relatively simple matter to plug together a few PCs and a network is created. But, as tens, hundreds, and then thousands, of computers and network servers are linked, the network takes on a life of its own, presenting a complexity that few organizations have ever encountered. As the network becomes more complex, the cost to support it, manage it, and merely understand it increases.

Training is another issue. An organization might have an entire information technology group familiar with the process of building sophisticated, centralized mainframe systems using COBOL and other mainframe tools. A vastly different skill set is required to design, implement and manage sophisticated client/server applications. Quite frankly, there is not a lot of experienced talent available for companies to use in this uncharted territory of "client/server" computing.

Pioneers who have downsized major ap-

And finally, there are other risks that must be clearly recognized up front. Matters of control which the organization has become accustomed to, such as backup and recovery procedures, security and privacy standards and controls, and software upgrades, prove to be much more difficult to ensure within a networked, distributed environment.

What stays on the mainframe?

Even though it is evident that the jury is still out on the cost and savings of downsizing, it is also obvious that the trend will continue. Given this, how can a company determine what applications should be downsized?

Colin Reay, market development manager, computer systems with Hewlett Packard in Toronto, suggests several methods to his customers. "First, if the customer is faced with an upgrade to get more processing power for the mainframe, it becomes an issue of how can they avoid the upgrade cost, which includes not just the cost of hardware, but of software, programs, support and programmers. With a downsizing of the application to a client/server environment, this extra cost can often be avoided."

"Secondly, the company can take a stance that anything new should not automatically be built on the mainframe, but should be redesigned. And that redesign will often imply an application developed on a smaller computer platform, leading to further downsizing activities in the organization. Each organization must determine which method works best for them,"

states Reay.

Mike Nettleton, an information systems consultant and principal with the consulting firm Peat Marwick Stevenson Kellog, echoes these thoughts. "What I am seeing move over are new applications or evolving applications, rather than old ones." Many companies don't believe that they should follow the trend to downsize systems when so much has been invested in certain major, mission critical business applications. If millions have been invested in a major system, and it is working well and fulfilling its original role, then it might not make sense to move it at all, particularly if the potential savings are fuzzy.

But by adopting an approach of examining new projects as candidates for downsizing, the company can proceed on a cautious basis. If an expensive upgrade looms in the future, perhaps it is time to re-consider the nature of the application. "The idea is to take both of these strategies together, and use them to move forward," states Reay.

Mainframe applications

Is it possible to identify what applications should stay behind on the mainframe?

According to Reay at HP, major applications that require a lot of storage should continue to involve the mainframe as a huge repository for that data. "For applications with a huge transaction processing load, why spread the data about, when one machine can hold and process all of it?" he asks.

As well, it seems there are three other categories of applications that can only be processed on a mainframe.

Heavy transaction-oriented processing, with a lot of concurrent users, requires a lot of computer horsepower. Commonly referred to as Online Transaction Processing systems (OLTP), examples are found within airline reservation systems, or on-line banking systems.

Second, there are very large-scale transaction systems that involve such a tremendous amount of data and processing, that an organization would be hard pressed to find a solution other than a mainframe. Examples are found within utilities, processing massive amounts of billing information, and in the insurance industry, where simple policy processing and tracking can involve major volumes of data.

Finally, systems which require a degree of centralized control or custodial roles

with high degrees of security and high degrees of availability, might require a centralized approach, and hence, a mainframe-oriented system. There is no doubt that mainframes, with their centralized control and sophisticated security software, provide a degree of security that can't be matched with smaller, distributed systems.

Carving off the application

Many organizations with mainframe applications are carving off specific parts for development on smaller scale systems. Call it partial-downsizing.

Sabre, the airline reservation system of American Airlines, is obviously a massive application running on several mainframes. Yet, Sabre is an active proponent of downsizing applications, and is doing so in such a way that it is providing access to the central data, through a variety of smaller front end inquiry systems.

As well, the Internal Revenue Service certainly must use mainframe technology for its processing needs. Yet it is moving forward with a number of client/server implementations on the side, rather than developing new applications on the mainframe. An example can be found in its Automated UnderReporter system, which uses a sophisticated series of Unix servers with Unix workstations to allow for examination of returns within its audit department. The focus of this project is to use the power and flexibility of the smaller scale systems to examine and access data which remains resident on the mainframe.

Mike Nettleton of PMSK agrees with the approach. "I am seeing applications that provide greater accessibility to information. For example, accessibility to information by a sales force, using personal computers to provide better access to information that already exists in a large, centralized database."

Proponents of this view believe that major efficiencies, cost savings and effectiveness can be found by developing "front ends" to large scale systems. The objective is to downsize the information inquiry, leading to systems that involve a mainframe on the backend for processing and accumulation of information, and sophisticated PC-based inquiry routines, often using some type of graphical user interface (GUI).

In other words, the mainframe just becomes a server in the client/server model. A server that is a bit bigger than most, per-

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haps, but still a server. In this model, the mainframe clearly has an ongoing life.

Getting it right the first time

With increasing evidence that potential savings can be difficult to achieve, what can an organization do to maximize the likelihood of a net benefit?

If a company plans to pursue downsizing, it is important to recognize that it isn't just a matter of moving an application from one computer to a smaller computer, or of shooting the mainframe, carting it out the door, and moving the applications onto the new system.

"Organizations that just move a process from one line of computer to another, without taking advantage of changing processes and changing the components of the application, are missing a big opportunity" states Jan Duffy, one of Canada's leading experts on what is called "business process re-engineering."

"You can move them, but you are not getting the benefits that you could get if the application was really changed. In fact," says Duffy, "with client/server technology, you can design new processes that are technologically enabled. In other words, you can design new applications that were never possible before because of limitations in the technology."

The idea is that you just don't move a bad application from a mainframe onto a client/server platform. You should first examine the business problem that you are trying to solve, and rebuild the application from the ground up. Don't change just the

computer application, but the procedures and steps surrounding the application as well.

This involves an in-depth, careful look at what you are trying to accomplish, and examining the best method of succeeding. "It's important to explore all potential opportunities for change," says Duffy. "My

IN DOWNSIZING, it isn't just a matter of shooting the mainframe, carting it out the door, and moving applications onto the new system.

rule for business process re-engineering is that it's full re-engineering or nothing."

Colin Wyatt of Lotus agrees, and indicates that BPR is the determinant factor in deciding which applications should run where. "Business process re-engineering, in fact, is really the key to deciding what stays on the mainframe, and what applications can be downsized for use by an increasingly larger set of intelligent end users."

The consensus, then, is that the mainframe plays an ongoing and valuable role in

the information processing requirements of organizations, and that it will continue to do so for some time. The complexity of moving applications off of a mainframe into sophisticated networked, client/server environments, is not yet fully understood. Caution, redesign, and planning seem to be the watchwords.

According to Nettleton, "the mainframe isn't dying. What is dying and what is dead already in many companies, is the ivory-tower, non-businesses oriented, non-responsive mainframe shop. But in the transformation to more responsive information technology departments there is an evolution of how the mainframe fits into the strategy, and how other elements such as PCs, LANs and the client/server model fits into that strategy. If I were a mainframe," says Nettleton, "I would be tempted to paraphrase Mark Twain, 'Rumors of my death have been greatly exaggerated.'"

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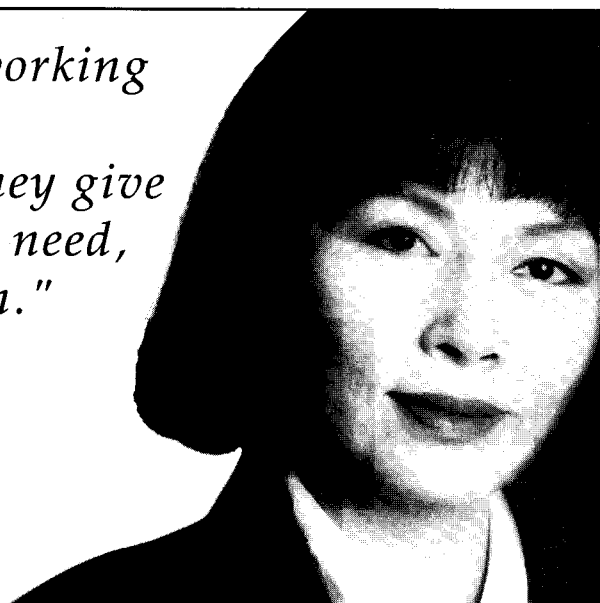
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